EXPERT REPORT OF ANCIL TAYLOR

PREPARED FOR:
THE OFFICE OF THE ATTORNEY GENERAL OF TEXAS
IN THE MATTER OF *UNITED STATES V. ABBOTT*
CASE NO. 1:23-CV-853-DAE

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STATEMENT OF QUALIFICATIONS

Ancil Taylor Dredging Consulting, LLC, of which Mr. Ancil Taylor is the managing partner, was retained by the Office of the Attorney General of Texas to provide expert opinion upon the facts at issue, expert reports produced by other testifying experts and deposition testimony rendered in the referenced case.

Mr. Taylor graduated with a BS in Construction Management in 1978 from the University of Southern Mississippi. Soon after joining C.F. Bean Corporation, a large U.S. based dredging firm, in 1978, Mr. Taylor was assigned to the Research and Development Department of Volker Stevin, a world class dredging contractor headquartered in The Netherlands. Mr. Taylor expanded his training in the science and practical applications of dredging over the next several years. Upon returning to the United States, he developed state of the art dredging science and applications to advance the capabilities and efficiency of equipment based in the U.S.

Mr. Taylor has more than 45 years of direct relevant experience in dredging and related marine issues. In addition to managing one of the nation's largest dredging firms, many of his projects have involved dredge production system designs, dredge construction inspection, dredge project contract negotiations, dredge project investigation, dredge site characterization, design, production and cost estimating, dredge crew management and project closeouts.

Mr. Taylor has been involved in the development of project designs across the nation to ensure optimal efficiency is achieved by the owner. Mr. Taylor has decades of both dredge production estimating, optimization and cost estimating for all types of dredging and marine related projects.

The opinions and comments included in this report are based upon the following:

1. Review of documents provided to Mr. Taylor by Mr. Johnathan Stone of the Texas Office of the Attorney General (list of documents is appended as Exhibit A).
2. Plaintiff's expert reports and depositions.
3. Interviews with other experts retained by Texas OAG in this matter.
4. Mr. Taylor's four+ decades of experience and training in the dredging industry with a broad spectrum of projects and equipment, including equipment that may be appropriate and applicable to the hypothetical dredging of the Rio Grande, Texas.
5. His experience and training in the dredging industry with a broad spectrum of projects that involve dredging material like that which might be encountered during dredging of the Rio Grande, Texas.
6. His experience with crews that operate the dredging equipment; and
7. His experience with entities and stakeholders that contract for services to operate dredging equipment to create navigation waterways and ports.

Mr. Taylor is not an attorney and has not provided any legal opinions or legal conclusions in this report. Mr. Taylor's CV is appended as Exhibit B.

EXECUTIVE SUMMARY

This study estimates the requirements for converting the Rio Grande into a commercially navigable waterway along its length from river mile 610 down to river mile 0 on the Gulf of Mexico. These estimates assume navigation by shallow draft commercial vessels, and this study generally assumes the lightest scale of traffic consistent with commercial purposes. Even under these assumptions, transforming the river into a navigable waterway would be impracticable.

In my opinion, if the Rio Grande were changed into a highway of commerce, it would likely be the most expensive navigable waterway ever created in the United States measured in cost per ton of cargo. I have estimated that the project would cost approximately $58.5 billion USD.

Necessary improvements can be broken down into two parts. First, a system of 45 locks and dams would be needed to overcome the steep decline in elevation from Lake Amistad (roughly 915 ft above sea level) to the Gulf (sea level). These locks and dams will need to be outfitted with

water pumps to recycle water upstream to retain adequate water levels for a reliable channel depth. Each set of locks and dams would create a reservoir, flooding adjacent land. Second, most of the river's length would then need to be excavated and the dredged material removed to ensure the entire channel is deep enough and wide enough to be passable by shallow draft commercial traffic. The banks of the river would also require stabilization after dredging.

Finally, even after converting the River into a navigable channel, its use as a functional and cost-competitive route for commercial traffic would be highly uncertain if not improbable. A navigable Rio Grande would be marked by numerous tight bends that could slow traffic and create increased risk of accidents. Meanwhile, South Texas already hosts developed truck and rail infrastructure that would likely be timelier and more cost effective.

<u>Budget Estimate</u>

I have calculated the cost of improvements needed to make the Rio Grande commercially viable. This study provides a budget estimate in the recap below, expressed in 2024 dollars.

- Cost item 1 represents budget estimates for the initial fabrication, mobilization, and installation of dredging equipment on the Rio Grande project site. It also includes the final cost of removal of all the dredging equipment from the Project site once dredging is complete.

- Cost item 2 is a budget estimate for the interim moves of the dredging equipment from one pool to another. A pool is the body of water between two sets of locks and dams. In this case, there would be forty-four of these individual interim moves.

- Cost item 3 is a budget estimate for a conventional lock and dam. This estimate is based upon the cost of twelve (12) locks and dams in 2008 dollars as reported by The United States Dept. of Agriculture Marketing Service's Study of Rural Transportation Issues, Chapter 12: Barge Transportation. These dams and their respective cost are attached as Exhibit C. According to this report from the USDA, the average cost of the locks is $695 million. The USACE Cost index, EM 1110-2-1304 (31 March 2024), was utilized for extrapolating cost to March of 2024. That index increased that figure to the value listed in Cost item 3.

- Cost item 4 is based upon reference to Dr. Tong Zhao's Expert report where he cites Capital Region Water's Appendix B – Basis of Cost Opinion's for Custom- Built Wet Well-Dry Well Pumping Station Facility Subtotal Construction Cost (with OH&P).

- Cost item 5 is based upon the budget estimated unit cost prepared by Mr. Taylor for dredging by the equipment described in the report below.

- Cost item 6 is based upon the budget estimated unit cost prepared by Mr. Taylor for installing slope protection along both banks of the Rio Grande after construction of the hypothetical navigation channel.

- Cost items 7 and 8 are blank place holders to indicate the costs that would inevitably be incurred from damaging the value of real-estate impacted by the project. Because this report offers a preliminary assessment, the amount of real-estate that would be impacted cannot be accurately ascertained. If an actual project were being planned, these costs would be estimated during the general design and site characterization phases of the project. These costs would be significant because the land area affected would be expansive.

- Cost items 9-12 are costs involved in the project's later-stage planning, including sediment testing, impact assessment and site characterization. While these costs will be significant, they have not been addressed in this report. In general, the cost for these items tends to vary between 8-12% of construction cost and will often take two to three decades to complete for a project of this type. During that time, construction will be stalled.

- Cost item 13, the cost of raising bridges and modifying or altering other structures along the River is also a significant unknown item at this stage. Changes in elevation of the water levels combined with the need to accommodate commercial vessel traffic safely will require the removal and reconstruction of virtually every bridge crossing of the Rio Grande. Some crossings may be incorporated into the new locks and dams. Those locations have not been identified at this time.

Table 1

Partial Cost Estimate for Creation of Highway of Commerce Rio Grande River Mile 0 - 610					
Item	Description	Unit	Units	Cost / Unit	Extended
1	Initial Mobilization and Demobilization (Dredging)	Lump Sum	1	$22,000,000	**$22,000,000**
2	Interim Transfers of Equipment to each Pool	Each	44	$1,800,000	**$79,200,000**
3	Construction of Lock & Dam	Each	45	$922,000,000	**$41,490,000,000**
4	Pumping Station at L&D for Returning Water Upstream	Each	45	$135,000,000	**$6,075,000,000**
5	Dredging Navigation Channel	Cubic Yard	95,900,000	$35.00	**$3,356,500,000**
6	Slope Protection	Tons	30,012,000	$250.00	**$7,503,000,000**
7	Land Acquisition for Dredge Material Placement Area (DMPA)	Acres	TBD	-	-
8	Land Acquisition for Inundadtion by Reservoirs	Acres	TBD	-	-
9	Project General Design	LS	TBD	-	-
10	Site Characterization	LS	TBD	-	-
11	Sediment Sampling / Testing	LS	TBD	-	-
12	Assessment of Impacts to Other Federal Projects (Brownsville)	LS	TBD	-	-
13	Bridges Raised (Highway and Rail Road), Removing /Altering misc structures along the River alignment.	LS	TBD	-	-
	Estimated Partial Cost (2024 USD)				**$58,525,700,000**

The average partial cost per mile $96,000,000

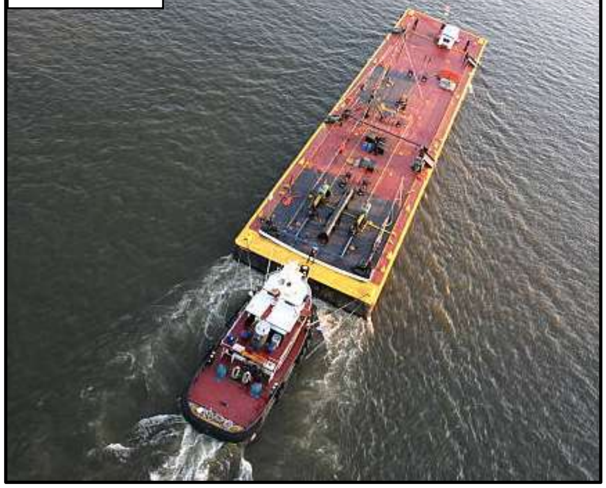
The items that have been estimated exceed $58 billion USD for an average of almost $96,000,000 per mile of waterway. This is an estimate of the initial capital cost to create a shallow/minimal draft waterway to accommodate vessels capable of transporting minimal cargo, like what might be encountered on the Gulf Intracoastal Waterway (GIWW) or the Atlantic Intracoastal Waterway (AIWW) along the east coast of the United States.

Vessels that transit the AIWW and GIWW are typically described as towboats pushing barges as seen in Figure 1 below. The towboats require 7-8 feet of water and the conventional hopper or deck barge used on these waterways require about 9 feet of water. The individual barges vary from about 190 – 209 feet in length, about 35-50 feet in width and are about 12-16 feet deep

overall. The barges may be rafted or tied together as two barges wide and two barges long if the width of the channel allows. The Tennessee Tombigbee (Tenn-Tom) waterway is a good example of the types of commercial traffic that is described here, although the winding and meandering characteristics of the Rio Grande would limit the number of barges that could be rafted together and still negotiate the tight bends of this river safely.

This report was prepared without the benefit of any of the hypothetical project's Basic Engineering Documents (General Design Memorandum[1]), a geotechnical analysis of the material to be dredged or a condition survey of the river to ascertain existing depths. Google Earth Pro was used to measure distance and the elevations of various land features and water levels. One purpose of this report is to inform various aspects of a Cost Benefit Analysis, CBA, prepared by others.

Figure 1



[1] A General Design Memorandum is an obsolete document and will not be prepared for any project. Either a limited or general reevaluation report shall be prepared in lieu of a general design memorandum (1110-2-1150). There is no indication that any of this analysis has been performed by any agency of the United States. There is also no indication the USACE has any condition hydrographic surveys of the river or geotechnical studies of the material in or around the Rio Grande.

REPORT OBJECTIVES

This study considers the feasibility of improvements designed to render the Rio Grande capable of navigation between river mile 610 and river mile 0 (i.e., the river mouth on the Gulf of Mexico). The first section of this report addresses the minimum dimensions the river channel must be adjusted to before it can sustain shallow draft vessels. I find that commercial navigation will require a channel 9 ft deep, 250 ft wide and outfitted with locks and dams to allow vessels to transit the river's steep decline in elevation. The second section examines the dredging work that must be done to modify the river to these necessary specifications. The final section concludes with my assessment that such a project is totally impractical.

1. DESCRIPTION OF NAVIGATION CHANNEL CREATION

Background

The Rio Grande (RG) is a river that originates in Colorado and forms the border between Texas and Mexico. The focus of this report is the overall length of the RG from the Amistad Reservoir, approximately 610 miles upstream, to the mouth of the river on the Gulf of Mexico. The RG empties into the Gulf of Mexico about 7.5 miles south of the entrance to the Brownsville Ship Channel.

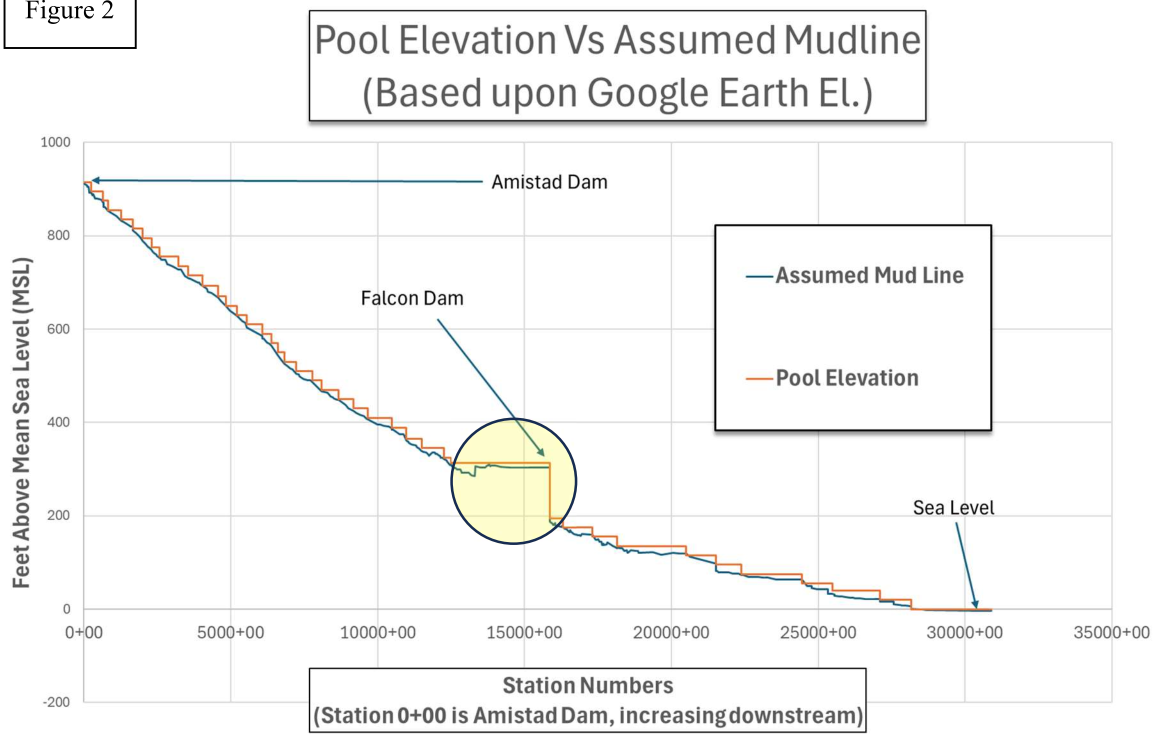
The RG's water elevation follows a steep downward slope over the 610-mile distance from Lake Amistad to the Gulf and crosses numerous artificial and natural obstructions along the way. Numerous shallow locations along its route are visible from the white-water rapids created by occasional releases[2] of water by the reservoirs and/or natural rain events. In fact, there are more

[2] The Amistad Reservoir releases batches of water to satisfy a hierarchal level of needs downstream. This priority level is established by the 1944 Water Treaty between the United States and Mexico.

than forty-five (45) such locations along the stretch just within the Fort Worth District boundaries and twenty-seven more from river mile 275.5 to the mouth between RM 610 and RM 0.0 that are visible with a simple desktop review on Goole Earth Pro. These obstructions make navigation along the waterway for any useful distance impossible for any vessel that requires more than a few inches of water. In addition, and not included in this list, are the numerous islands that are visible above the water surface in the RG. These islands vary in size from a few square feet to several acres, and each island's size varies depending upon the water level at different times.

The water elevation at the Amistad Reservoir is 915 feet above sea level. Therefore, the 610 miles from Amistad to the Gulf involves more than a 900-foot drop in elevation. When water enters the RG downstream of the Amistad Reservoir either by a release of water from the reservoir or natural rainfall within the watershed it travels down the RG rapidly. The obstructions in the RG described above slow the rate of flow somewhat as the water travels over the white-water rapids or sills, but water still moves quickly because of the steep slope. See Figure 2 below.

Figure 2



Waterways marked by steep changes in elevation typically require a network of locks and dams to enable even shallow draft navigation. Another river in the United States that is relatively steep is the Tennessee-Tombigbee ("Tenn-Tom") waterway with its mouth near Mobile, AL. This waterway requires ten (10) locks and dams to facilitate the transport of vessels from sea level to elevations of approximately 341 feet above sea level over 450 miles. Comparatively speaking, the RG is twice[3] as steep as the Tenn-Tom and would require more locks and dams per unit of length than that which is required for similar size vessels on the Tenn-Tom.

[3] The Tenn-Tom drops an average of 0.75 feet per river mile (341 feet / 450 miles) and the RG drops 1.50 feet per river mile (915 feet / 610 miles).

Figure 3

To create a highway of commerce on the RG, the river would require a channel to accommodate vessel traffic so that ships can travel the waterway safely, dependably, and predictably. A minimum draft requirement for the shallowest practical cargo transport is around 9-10 feet. For example, the Gulf Intracoastal Waterway (GIWW) is authorized as shallow as 12 feet. To provide another example, the Tenn-Tom waterway is currently authorized to 9 feet of water. According to Mr. Nelson Sanchez, Chief of Operations of the USACE Mobile District, the Tenn-Tom waterway is currently being considered for increase to 11-12 feet of water.

A safe channel width varies with the hydrodynamics of a river. The GIWW is relatively straight with very few significant bends, and its authorized width is 125 feet. The RG is a tight, bending, and meandering waterway, and will require a wider channel to facilitate safe movement of the commercial vessels. On the Tenn-Tom waterway for example there are more bends and turns along the river than you would see on the GIWW. Therefore, the Tenn-Tom waterway's authorized width varies between 280-300 feet. On the RG, a channel width of only 250 feet[4] is assumed in this study. This is a minimum assumption that makes the smallest allowance for the

[4] The Tenn-Tom waterway has fewer bends, and the bends have a longer radius. The authorized width of the Tenn-Tom waterway varies from 280 – 300 feet. Using 250 feet width for the RG is likely less safe than would eventually be approved and represents a strict minimum. Therefore, the cost estimate and quantity estimate for dredging are optimistic and could be lower than actual costs would be.

RG's tight bends. Modeling of the river hydrodynamics would be required to establish an appropriate width for safe vessel passage.

Vessel captains transporting cargo will require reasonable assurance that if they travel up the waterway, they will not be stranded when the water level drops. This can happen when water quickly flows downstream and is not replenished by additional water flowing from the Amistad Reservoir. A continuous release of water from Amistad would be required to provide sustainable, predictable, and safe navigation for a highway of commerce on the RG. The amount of water necessary to be released from Amistad depends upon the height of water necessary for the vessel traffic.

According to Dr. Doug Shields, the amount of water necessary from Amistad to satisfy the navigation requirements along the RG's open channel would empty the available capacity from Amistad in just a matter of weeks with little water remaining to meet the higher priority irrigation requirements downstream. In fact, the amount of water necessary to satisfy safe navigation needs exceeds the release capacity of Amistad, reported by Mr. Adrian Cortez as 8,400 cubic feet / second (cfs). Dr. Shields' estimate roughly matches testimony given by the IBWC's own Mr. Adrian Cortez who predicted that Lake Amistad would run dry within several months if Amistad Dam released water at its maximum release capacity of 8,400 cfs.

Creating a Sustainable Highway of Commerce

With the Amistad Reservoir unable to satisfy the water requirements to sustain safe, dependable navigation without the complete evacuation of its reservoir capacity, an alternative means to retain the water within the navigation system is required. Locks and Dams are the most practical means to move vessels up and down steep or elevated waterways. Waterways that are

steep have strong currents for as long as water is available to flow down the channel. The water moves quickly, and vessels moving upstream will require significant horsepower to overcome the current. Vessels traveling downstream must maintain speeds that exceed the current velocity to retain control of steering. For a waterway as steep as the RG, locks and dams are the only practical option to overcome the slope of the River.

Optimizing the design of a lock and dam systems involves balancing the number of sets of locks and dams with the drop-off elevation at each set. Fewer locks and dams require greater lifts per structure and, as a result, larger dams. Larger dams create larger reservoirs, and sizeable reservoirs in turn significantly expand the acreage of land that becomes inundated post-construction with the new water that fills the reservoirs.

This study took its cue from the Tenn-Tom waterway. The similarity between the Tenn-Tom's geography and that of the lower RG makes the Tenn-Tom an ideal comparison. Estimates for the hypothetical RG channel follow actual data pertaining to the Tenn-Tom waterway. This study stipulates similar[5] lifts for a similar shallow draft channel and predicts this would result in roughly 45 sets[6] of locks and dams along the River alignment over the 610 miles in this study. That would result in an average lift of roughly 20 feet per lock structure. This average dimension also appears to be consistent with the desire to minimize the inundation of surrounding land. The average distance between the locks and dams would be approximately 13.5 miles. Exhibit D, a

[5] The Tenn-Tom has an average lift of approximately 34 feet per Lock and Dam. Due to the general surrounding terrain of the RG, lifts that exceeded 20-25 feet would flood or inundate significantly more farmland and real-estate with each reservoir. A more thorough study of optimizing lock and dam dimensions to the specific areas of inundation is necessary to better define the numbers.

[6] The Falcon Lake Dam has a change in elevation of more than 100 feet. This study assumes Falcon dam would be accompanied by four (4) new locks in addition to the forty-one (41) others that would be necessary along the river. Therefore, a total of 45 new structures would be created.

Google Earth image, depicts approximate locations that may be appropriate for the placement of these lock and dam structures.

While these locks and dams will create a more efficient use of the water released by the Amistad, they will result in a greater surface area of water subject to evaporation. Dr. Doug Shields' study reveals an additional requirement of water due to added evaporation.

Figure 4

Table 5. Water requirements for Rio Grande lock operations.

number of lockages per day	ft³/day	acre-ft/day	cfs	acre-ft/yr	% of mean annual flow at Laredo	% of 25%ile annual flow at Laredo	% of 10%ile annual flow at Laredo
1	1,505,250	34.6	17.4	12,622	0.6%	1.0%	1.1%
2	3,010,500	69.1	34.8	25,243	1.2%	1.9%	2.2%
3	4,515,750	103.7	52.3	37,865	1.8%	2.9%	3.3%
4	6,021,000	138.2	69.7	50,486	2.4%	3.9%	4.4%
5	7,526,250	172.8	87.1	63,108	3.0%	4.8%	5.5%
6	9,031,500	207.3	104.5	75,729	3.6%	5.8%	6.6%
7	10,536,750	241.9	122.0	88,351	4.3%	6.7%	7.7%
8	12,042,000	276.4	139.4	100,972	4.9%	7.7%	8.8%
9	13,547,250	311.0	156.8	113,594	5.5%	8.7%	9.9%
10	15,052,500	345.6	174.2	126,215	6.1%	9.6%	11.0%
11	16,557,750	380.1	191.6	138,837	6.7%	10.6%	12.0%
12	18,063,000	414.7	209.1	151,458	7.3%	11.6%	13.1%
13	19,568,250	449.2	226.5	164,080	7.9%	12.5%	14.2%
14	21,073,500	483.8	243.9	176,701	8.5%	13.5%	15.3%
15	22,578,750	518.3	261.3	189,323	9.1%	14.5%	16.4%
16	24,084,000	552.9	278.8	201,944	9.7%	15.4%	17.5%
17	25,589,250	587.4	296.2	214,566	10.3%	16.4%	18.6%
18	27,094,500	622.0	313.6	227,187	10.9%	17.4%	19.7%
19	28,599,750	656.6	331.0	239,809	11.6%	18.3%	20.8%
20	30,105,000	691.1	348.4	252,430	12.2%	19.3%	21.9%
21	31,610,250	725.7	365.9	265,052	12.8%	20.2%	23.0%
22	33,115,500	760.2	383.3	277,673	13.4%	21.2%	24.1%
23	34,620,750	794.8	400.7	290,295	14.0%	22.2%	25.2%
24	36,126,000	829.3	418.1	302,916	14.6%	23.1%	26.3%
25	37,631,250	863.9	435.5	315,538	15.2%	24.1%	27.4%

Operating the locks and dams will entail moving large volumes of water. Conventional locks and dams raise and lower vessels along the waterway by flooding a lock with the necessary amount of water to equal the upstream elevation at the lock. The locking procedure releases the same amount of water downstream at each locking event. Therefore, even with conventional locks and dams, there remains a significant demand for water from Amistad that is a function of the number of locking events per day. According to Dr. Doug Shields, the adjacent Figure 4 (Table 5) indicates the amount of water required vs the number of locking events per day on the RG.

To preserve water that would normally be conveyed downstream using conventional locks, a more unconventional system would be appropriate for the RG waterway, namely the RG would

require recycling water pumps. Rather than allowing water to escape downstream at each locking event, a pumping system that recycles the water back upstream will preserve some of the water used by the locks and dams. This unconventional approach would not mitigate the loss of water through the expanded evaporation footprint but could mitigate much of the water lost directly related to the locking procedure. The pumping station's flowrate for the recycled water in this study is approximately 600 cubic feet per second (cfs).[7] At that rate, approximately 41 minutes would be required to recycle the water from each locking event back upstream. Since each of the forty-five (45) locks and dams would require this capability, this unconventional locking approach has been estimated to cost approximately $6.075 billion (See cost items 3&4 above).

2. Navigation Channel Creation Cost Estimate

Creating the Navigation Channel and Cost Estimate

In addition to installing an extensive system of locks and dams, the RG will need to be excavated to suitable dimensions to be made susceptible to navigation by shallow draft vessels. This is necessary to determine the required amount of excavation to create the channel.

Figure 5

Existing Depth of Water (ft)	Cys to be Removed
1	134,500,017
2	114,093,017
3	95,821,997
4	79,921,509

Waterways that are used for navigation are typically monitored by the USACE using hydrographic "condition" surveys. These condition surveys help mariners by informing them of water depths. This information is used to mitigate risk of groundings and other accidents. As of the preparation of this study, a condition hydrographic survey of the RG had not been performed

[7] Given the unlikely nature of the improvements being considered, there is no industry standard for this value. The number I have assumed is drawn from my experience and considered judgment of what a reasonable value for pumping station flowrate would be.

by the USACE. Therefore, this study assumed the existing condition as an average of three (3) feet of water over a width of 250 feet along the 610-mile stretch of the RG. The table in Figure 5 depicts the estimated quantity to be dredged as a function of existing water depth[8].

Based upon a site visit by Captain Ciarametaro and Mr. Taylor's general experience with the region, the material that would need to be dredged is likely fine silty sand near the mouth of the RG. Along the upper portions of the stretch within this study, the material is assumed to be vuggy[9] limestone and caliche. The limestone may be composed of soft formations with gravel in some areas while in others, the limestone has more strength, competency and could be less vuggy.

A genuine project would include extensive examination of the soil and surface geology of the dredge site. The material to be dredged would be adequately characterized geotechnically and analytically evaluated for contamination. Sediments that have been contaminated by activities within the watershed that may also present a risk to the human population may require remediation. Remediation methods involving dredged sediments will vary with the type and extent of contamination. Testing of sediments performed during the preliminary design studies will ascertain the extent of contamination, if any, within the waterway. If sediments are contaminated, resuspension of these sediments into the water column could significantly increase risk to the population downstream. The estimate in this study does not include the cost of any special handling requirements due to contamination of the sediments in or around the RG.

[8] Google Earth Pro was used to determine water elevation along the stretch of the RG. Assuming a water depth of three (3) feet across the assumed width of 250 feet informs the calculation model of the elevation of the existing water bottom. This elevation allows the quantity of material to be dredged to be estimated.
[9] When limestone is vuggy, it contains voids or large pockets of air which may diminish the strength or competency of limestone. Vugginess can indicate resistance to penetration by dredging equipment and therefore, the cost of dredging.

Figure 6

Based upon these conservative assumptions, two types of dredging machinery were used in this study to create the channel. On the lower portions of the RG, downstream of Lock and Dam 1 at sea level, a medium size cutter suction dredge was utilized. This material would be transported hydraulically through a slurry pipeline to an approved Dredge Material Placement Area (DMPA). Along the upper portions of the RG reach, a marine excavator, like the one depicted in Figure 6 would be more appropriate. Marine excavators are very robust dredgers with the capability of being anchored with "jack-up" spuds that attach to the riverbed. This feature allows the excavator to deploy and utilize the "breakout" forces of the machine to fracture and remove limestone and / or caliche from the seabed.

Material Handler

Once the material is removed from the seabed, it is placed on a deck barge. A tugboat will ferry the deck barge to an unloading location along the riverbank within the pool. Upon arrival at the unloading location, another machine called a material handler will unload the deck barge and place the dredged material into dump trucks for transport over road to a DMPA. Once unloaded, the deck barge is returned to the marine excavator dredge to be loaded again. The number of deck

barges necessary for hauling material will depend upon the haul distance between the specific dredge site and the unloading location.

All of the equipment described above that will be used inside of the sequence of pools must be transportable over land as the equipment will be moved many times over the course of the project. Each piece of equipment will be composed of several elements. At each dredging location (pool), the elements will be assembled into a marine excavator, tender boats, deck barges, etc. Upon completion of dredging at each location (pool), the equipment spread will be disassembled, transported to the next location and re-assembled.

Many of the dredging locations will require slope protection to inhibit erosion of the channel banks due to vessel traffic. The specific requirements for this can be determined only after the project site characterization and design have been completed.

The budget estimate provided includes the initial mobilization, forty-four (44) interim moves to the subsequent pools and one demobilization from the site. The cost estimate also includes site overhead, site safety and health officers (SSHO), project engineering, surveying, administration, contingency, home office overhead, and profit.

3. Feasibility of improvements to the Rio Grande

Converting the Rio Grande into a navigable waterway to facilitate transportation of commercial cargo is impractical. The RG's proximity to the Ports of Corpus Christi and Brownsville obviate the need for its own highway of commerce or navigable waterway. The steepness of the RG and the corresponding need for the multiple locks and dams will result in lengthy and extended trip durations for vessels navigating the RG. The cost and complexity of

creating this navigable waterway exceeds the cost and complexity associated with the most recent expansion of the Panama Canal to cross the isthmus of Central America by a magnitude.

Plaintiff's expert, Mr. Timothy MacAllister, suggests that the RG can be made susceptible to navigation between river miles 275.5 and 610, simply by dredging shoals, removing sandbars, snags and clearing debris. In fact, clearing and dredging alone would increase the rate at which the RG conveys its valuable and limited water resource downstream. This would reduce the amount of time navigation, if any, could exist and it will not maintain water depths as he suggests since the water would leave this stretch of the river more readily. While Mr. MacAllister acknowledges his experience with dredging for navigation is limited, the physical science of increasing a river's efficiency by clearing obstructions and allowing water to flow downstream faster is well known within the USACE.

CONCLUSIONS

The improvements necessary to transform the Rio Grande River into a channel capable of commercial navigation of shallow draft vessels would not be practical. Under the most optimistic assumptions, the river would need to be substantially excavated to widen and deepen it to reach the 9-foot depth and 250-foot width minimums, and a system of 45 locks and dams would need to be built before navigation by the smallest variety of commercial-scale craft would be possible. These improvements would cost upwards of $58 billion and may not lead to any offsetting benefits given the presence of more efficient rail and road alternatives.

The foregoing constitutes Mr. Taylor's opinions based on his experience, the facts, reports, depositions in this matter, and interviews with others. The opinions are compiled and submitted in this report. As discovery is ongoing, and / or additional information that further characterizes the site described in this report becomes available, Mr. Taylor reserves his right to amend or supplement the analysis and opinions herein.

Approved by:

____________________________________ Date: June 14, 2024

Ancil Taylor
Managing Partner
Ancil Taylor Dredging Consulting, LLC

REPORT SUPPLEMENTS

Exhibit A. **Documents Reviewed**
Exhibit B. **Ancil Taylor CV**
Exhibit C. **Cost of Locks and Dams – 2008**
Exhibit D. **Google Earth image depicting locations of hypothetical Locks and Dams**

Exhibit A

Documents Reviewed:

1. Expert Report and Deposition of Mr. Adrian Cortez
2. Expert Report and Deposition of Mr. Timothy MacAllister
3. Expert Report of Captain John C. Timmel
4. Expert Report of Dr. Benjamin Johnson

5. PLAINTIFF'S AMENDED RESPONSE TO DEFENDANTS' FIRST SET OF INTERROGATORIES TO PLAINTIFF
6. United States v. Abbott (W.D. Tex. No. 23-cv-853) – Identification of United States' anticipated expert witnesses at trial

7. 34 Shelnutt Declaration Exhibit A
8. 35 Shelnutt Declaration Exhibit B

9. https://www.ams.usda.gov/sites/default/files/media/RTIReportChapter12.pdf

10. USACE Cost index, EM 1110-2-1304 (31 March 2024)

11. Expert Report of Dr. Tong Zhao

12. Expert Report of Dr. Doug Shields

Exhibit B

ANCIL TAYLOR

Subject matter expert in dredging and related marine issues

EDUCATION / TRAINING

BS, Construction Management, 1978, University of Southern Mississippi, Hattiesburg, MS.

Continued Research and Development in The Netherlands to enhance dredging science and technology. 1978 - 2007

REGISTRATIONS / CERTIFICATIONS / PATENTS

Patent(s) 5,269,365, & 6,860,989

Slurry Processing Unit(s)

YEARS OF EXPERIENCE

Total: 45

SUMMARY

Mr. Taylor has more than forty-five (45) years of direct experience in the field of marine dredging and related marine issues. His experience includes numerous coastal restoration projects along the Gulf, East, and West coasts of the United States as well as large inland lakes and reservoirs.

Mr. Taylor has been involved in the maintenance as well as expansion of this nation's ports through the deepening and widening of many of the offshore entrance channels and navigation channels along all coasts of the United States. In addition to the primary goal of enhancing navigation, the Beneficial Use of dredged material was a primary goal of Mr. Taylor's.

As President of Bean Environmental, Mr. Taylor lead one of the most technically progressive and innovative marine dredging remediation companies in the United States. He has studied and developed science in the transportation of dredge slurries in addition to many aspects of the dredge production process. As the inventor of a significant technology breakthrough in slurry transportation, he holds patents for the development and implementation of the Slurry Processing Unit, SPU.

Mr. Taylor served as the Chairman of the Board of the Western Dredging Association, WEDA. WEDA is the largest of three divisions of the World Dredging Association, WODA. Mr. Taylor also served as Chairman of the World Dredging Congress, WODCON. He has been consulted in various dredging sciences by the Marine Board of the National Academy of Science. Mr. Taylor was recognized and honored by his peers in 2011 by receiving the "Dredger of the Year" award for the western hemisphere as testimony to his outstanding and remarkable achievements in the dredging industry.

His role as a consultant includes clients that require a more thorough understanding of dredging project applications. Clients include a broad spectrum of both private and public stakeholders in dredging that seek project and procurement optimization. Numerous large and small engineering firms are beneficiaries of Mr. Taylor's broad experience. Developing projects for long distance slurry transportation is a major area of focus in recent years.

Mr. Taylor serves as an expert and specialist in dredge project characterizations, developing solutions for complicated and sensitive dredging applications and performing constructability reviews. His four+ decades of experience in connecting the most challenging dredging requirements with science based practical solutions has resulted in a list of very successful projects for his clients. He identifies project needs and develops specific dredge equipment requirements to meet those needs.

Exhibit B

RELEVANT EXPERIENCE

Dredging

Mr. Taylor entered the field of dredging after graduating from the University of Southern Mississippi in 1978. Initially, his assignments involved project layout and field engineering for various types of dredging projects. Within a couple of years, he was chosen to be the recipient of a comprehensive training investment into the science of dredging in The Netherlands. Mr. Taylor was transferred and assigned to the Research and Development Department of the largest dredging company in the world at that time, Volker Stevin of Rotterdam. His focus on training and education included the transportation of dredge slurries, production optimization including dredge automation. Upon his return to the United States in the early 1980's, he began building a Production Engineering department in the Bean Dredging organization. That department was soon to become known as "cutting edge" in the United States dredging industry. With hundreds of actual dredging projects in his portfolio, he now has experience with virtually every type of dredging application. He currently serves as a subject matter expert on a broad range of dredging related issues providing in-depth design and constructability reviews for his clients. He was qualified and is recognized as an expert in the field of dredging by the United States Court of Claims in Washington DC.

Dredge Types

Mr. Taylor's direct hands-on experience includes numerous dredge types including:

1. Medium and large trailing suction hopper dredges (TSHD) in all phases of operation, including pump-off, nearshore placement of dredged material for re-handling or coastal protection along the Gulf, East and West Coasts of the United States,
2. Cutterhead suction dredges (CSD) ranging in size from 8-inch to 32-inch pipeline diameter, long distance transport with multiple boosters, near shore placement and thin layer placement, along the Gulf and East Coasts of the United States.
3. Small auger head (AU) dredges,
4. Plain suction dredges (PS)
5. Dustpan dredges for both inland river applications as well as ocean going offshore operations, nearshore placement for beneficial uses,
6. Clamshell (wireline) bucket dredges (CL) along with barge transport operations,
7. Large and small Marine Excavators, barge mounted stationary backhoe (BH) including amphibious, Amphibex,
8. Barge unloaders in both hydraulic and mechanical mode of operation,
9. Hybrid combinations of dredge types including mechanical dredging and hydraulic transportation, (see patent above.)
10. Environmental dredging applications associated with handling sensitive impacted sediments.

Project Types

Mr. Taylor's project portfolio includes maintenance and new work (capital) dredging of this nation's ports and waterways ranging from deep draft to shallow draft. With his primary residence in southern states during his career, his dredging experience across the Gulf Coast and East Coast has provided him with an understanding of the issues associated with dredging related challenges available to very few people. Working with stakeholders, private and public, to identify opportunities to beneficially use dredge material is a specialty of Mr. Taylor. He has worked closely with numerous states and federal

Exhibit B

agencies to identify and seize upon opportunities to beneficially use dredged material, especially in the coastal zone strategically and synergistically. Coastal restoration, land creation and marsh habitat development have been a centerpiece for Mr. Taylor for more than 35 years. Whether it involves mining sediment from the Mississippi River or its distributaries or from offshore deposits along the gulf and east coasts of the United States, his experience covers the entire spectrum of mining sediments for creating land. Mr. Taylor designed the emergency response to the BP Oil Spill in 2010. This effort included significant work with the USACE, the White House CEQ, and numerous regulatory agencies to secure the necessary authority to construct tens of miles of barrier berms to protect the fragile marshes of South Louisiana. Nearshore placement and rehandling of dredged material were a centerpiece of the design. https://www.waterwaysjournal.net/2010/08/16/ancil-taylor-heads-sand-boom-dredging-effort-to-protect-gulf-coast-from-deepwater-horizon-oil/

Mr. Taylor also helped to design a project and construct a dredge to create the Behren's Trench across the Great Salt Lake. https://epod.usra.edu/blog/2014/06/behrens-trench.html

Sediment Transport

Transportation of dredge sediments is a specialty of Mr. Taylor's. His thorough understanding of the science of dredged sediment transport refined by decades of hands-on practice provides his clients with unprecedented access to real world experience. Mr. Taylor helped to pioneer the transportation of sediments over long pipeline distances. His development of transportation science, dredge and booster automation, and dredge pipeline dynamics associated with pressure and flow opened many new opportunities for executing many projects around the nation. Predicting dredge and slurry transport performance and production is critical to properly designing dredge projects. His patented technology for slurry transport and dredge automation yields significant savings in many slurry transport applications.

Exhibit C

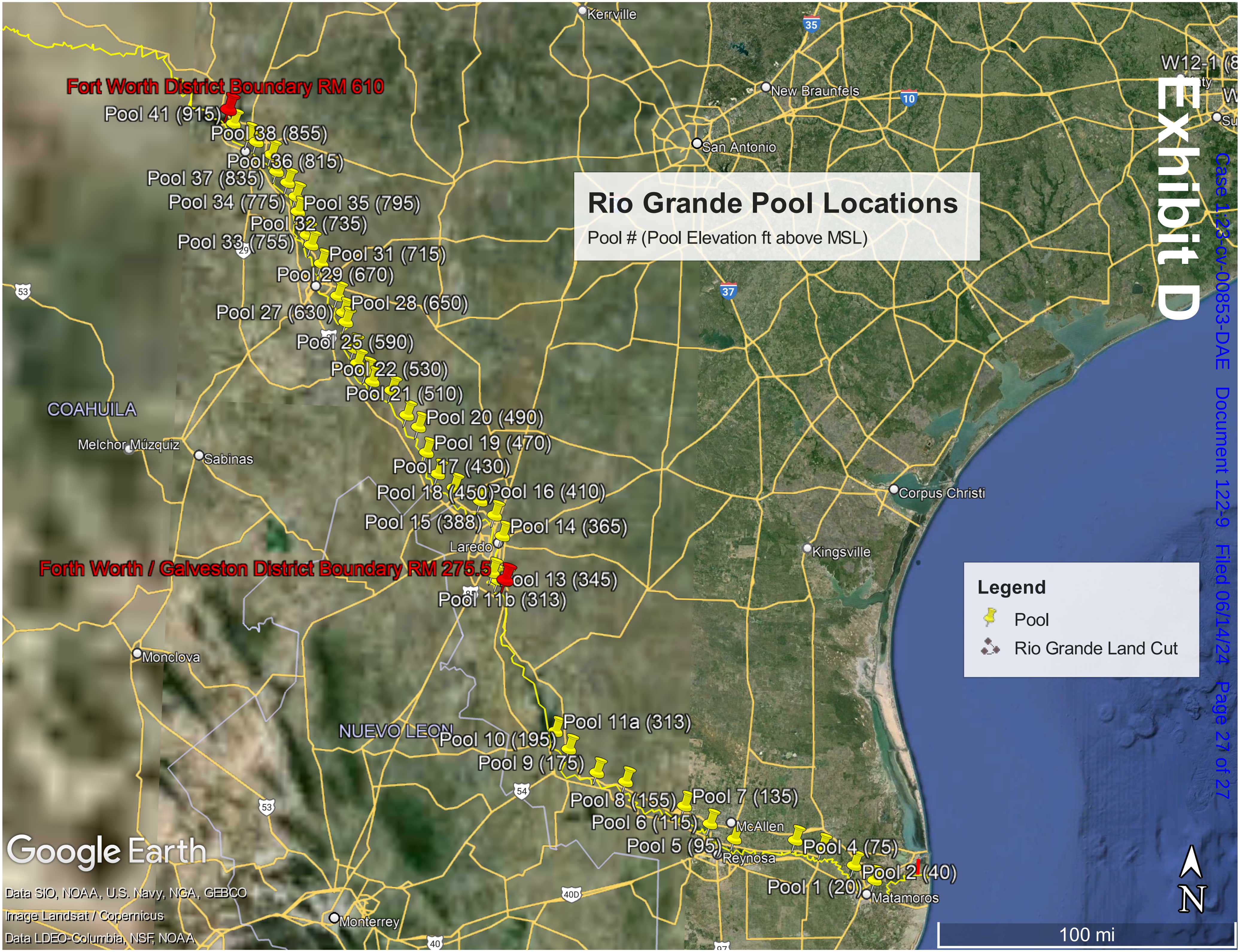
Cost of Locks and Dams in The United States

			Total Cost of Project	Allocated through FY 2008	Funding Needed to Complete
			1,000 Dollars		
New Construction Projects *					
1	Olmsted Locks and Dam	Ohio River	2,067,000	992,946	1,074,054
2	John T Myers Locks and Dam	Ohio River	232,400	9,017	223,383
3	Greenup Locks and Dam	Ohio River	245,000	8,236	236,764
4	Kentucky Lock and Dam	Tennessee River	663,500	256,782	406,718
5	McAlpine Locks and Dam	Ohio River	429,280	423,010	6,270
6	Inner Harbor Navigation Canal Lock	New Orleans, LA	733,300	140,653	592,647
7	Grays Landing Lock and Dam	Monongahela River	178,046	177,446	600
8	Locks and Dam 2,3, and 4	Monongahela River	750,000	487,914	262,086
9	Point Marion, Lock and Dam 8	Monongahela River	113,574	112,974	600
10	Chickamauga Lock	Tennessee River	364,600	93,775	270,825
11	Marmet Locks and Dam	Kanawha River	405,822	396,820	9,002
12	Robert C. Byrd Locks and Dam	Ohio River	383,500	372,968	10,532
Total New Construction			6,566,022	3,472,541	3,093,481

	Quarterly Cost Indices (USACE)	EM 1110-2-1304 (31 March 2024)	695	1170
	Project		Project Cost in 2008 $1000	Project Cost in 2023 $1000
1	Olmsted Locks and Dam Ohio River		$2,067,000	$3,480,399
2	John T Myers Locks and Dam Ohio River		$232,400	$391,313
3	Greenup Locks and Dam Ohio River		$245,000	$412,529
4	Kentucky Lock and Dam Tennessee River		$663,500	$1,117,196
5	McAlpine Locks and Dam Ohio River		$429,280	$722,818
6	Inner Harbor Navigation Canal Lock New Orleans, LA		$733,300	$1,234,725
7	Grays Landing Lock and Dam Monongahela River		$178,046	$299,793
8	Locks and Dam 2,3, and 4 Monongahela River		$750,000	$1,262,844
9	Point Marion, Lock and Dam 8 Monongahela River		$113,574	$191,235
10	Chickamauga Lock Tennessee River		$364,600	$613,911
11	Marmet Locks and Dam Kanawha River		$405,822	$683,320
12	Robert C. Byrd Locks and Dam Ohio River		$383,500	$645,734
	Total New Construction		$6,566,022	$11,055,818
	Average / Project		**$547,169**	**$921,318**

Added water recycling capability at each lock and dam. (x$1000) **$134,703**

Exhibit D


Rio Grande Pool Locations
Pool # (Pool Elevation ft above MSL)
Legend
Pool
Rio Grande Land Cut
Fort Worth District Boundary RM 610
Forth Worth / Galveston District Boundary RM 275.5
Pool 41 (915)
Pool 38 (855)
Pool 36 (815)
Pool 37 (835)
Pool 34 (775)
Pool 35 (795)
Pool 32 (735)
Pool 33 (755)
Pool 31 (715)
Pool 29 (670)
Pool 28 (650)
Pool 27 (630)
Pool 25 (590)
Pool 22 (530)
Pool 21 (510)
Pool 20 (490)
Pool 19 (470)
Pool 17 (430)
Pool 18 (450)
Pool 16 (410)
Pool 15 (388)
Pool 14 (365)
Pool 13 (345)
Pool 11b (313)
Pool 11a (313)
Pool 10 (195)
Pool 9 (175)
Pool 8 (155)
Pool 7 (135)
Pool 6 (115)
Pool 5 (95)
Pool 4 (75)
Pool 2 (40)
Pool 1 (20)
Kerrville
New Braunfels
San Antonio
Corpus Christi
Kingsville
Laredo
McAllen
Reynosa
Matamoros
Monterrey
Monclova
Sabinas
Melchor Múzquiz
COAHUILA
NUEVO LEON
100 mi
N
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA